

Claims

- 1 A method of controlling an exhaust filter regeneration regime in which
5 fuel is injected into an exhaust stream to increase exhaust stream
temperature in conjunction with a catalytic treatment element, the method
comprising the step of metering fuel injection dependent upon the exhaust
stream temperature.
- 2 A method as claimed as claim 1 in which the fuel injection is metered by
10 controlling one of the fuel injection rate, fuel injection pulse duration,
amount of fuel injected, fuel injection pressure variation, injected fuel type
variation.
- 3 A method as claimed in claim 1 or claim 2 in which the exhaust stream
15 temperature comprises the temperature of the exhaust stream at the outlet
of the catalytic treatment element.
- 4 A method as claimed in claim 3 in which fuel injection is further metered
20 dependent upon the temperature of exhaust gas exiting the engine and the
temperature at the inlet of the catalytic treatment element.
- 5 A method as claimed in any preceding claim comprising initiating fuel
injection into the exhaust stream when the filter load exceeds an initiation
value.
- 6 A method as claimed in any preceding claim in which fuel injection is
25 terminated upon any of: filter load reducing to a predetermined

determination threshold, catalytic treatment element temperature reducing below or exceeding a termination threshold or regeneration regime period exceeding a time threshold.

- 5 7 A method as claimed in any preceding claim further comprising recording a regeneration regime history and modifying the regeneration regime based on the recorded history.
- 10 8 A method as claimed in any preceding claim further comprising the step of pre-heating with vehicle waste heat fuel to be injected.
- 15 9 A method as claimed in any preceding claim in which fuel is mixed with compressed air in an injection head prior to injection into an exhaust stream.
- 20 10 A method as claimed in claim 9 in which supply of fuel to the injection head is terminated a predetermined instant prior to termination of compressed air supply.
- 25 11 A method of triggering an exhaust filter regeneration regime comprising obtaining a value of filter load as function of filter pressure and exhaust mass flow and triggering a regeneration regime when the filter load exceeds a predetermined value.
- 30 12 A method as claimed in claim 11 comprising the step of initiating fuel injection into the exhaust stream upon triggering the exhaust filter regeneration regime.

- 13 A method of triggering an exhaust filter regeneration regime comprising
monitoring filter pressure peak values, identifying when a filter load
exceeds a predetermined value from the monitored peaks and triggering a
regeneration regime.
- 14 A method of triggering an exhaust filter regeneration regime in which fuel
is injected into an exhaust stream to increase exhaust stream temperature
in conjunction with a catalytic treatment element comprising obtaining a
value of catalytic treatment element temperature and triggering the
regeneration regime when the obtained temperature exceeds a
predetermined value.
- 15 A method as claimed in claim 14 further comprising obtaining a value of
the filter load as a function of the filter pressure and exhaust mass flow
and triggering the regeneration regime when the filter load exceeds a
predetermined value.
- 16 A method of controlling an exhaust filter regeneration regime comprising
implementing an exhaust stream temperature control strategy, monitoring
variation in exhaust stream temperature and at least one control parameter,
obtaining a correlation between variation in exhaust stream temperature
and the control parameter and adjusting the temperature control strategy
based on the correlation obtained.
- 17 An exhaust filter regeneration apparatus comprising a fuel injector
arranged to be mounted in an exhaust stream conduit and a controller for

controlling the fuel injector to implement a method as claimed in any preceding claim.

- 5 18 An exhaust filter regeneration apparatus comprising an exhaust stream conduit and a fuel injector mounted therein and arranged to inject fuel in an exhaust stream direction.
- 10 19 An exhaust filter regeneration apparatus as claimed in claim 18 in which the fuel injector includes a fuel input channel and an air input channel, each channel having an output end, whereby the output ends of the air and fuel channel are provided adjacent one another at a fuel injection output.
- 15 20 An exhaust filter regeneration apparatus as claimed in claim 19 in which the fuel input channel is connected to a fuel pump and the air input channel is connected to a compressor.
- 20 21 An exhaust filter regeneration apparatus as claimed in claim 20 in which said fuel pump is a peristaltic pump.
- 22 An exhaust filter regeneration apparatus as claimed in claim 20 whereby said compressor is arranged to operate in the pressure range of 2 to 200 bar.
- 25 23 An exhaust filter regeneration apparatus as claimed in any claims 17 to 22 having an electrical heater located before an exhaust gas input face of the catalytic treatment element.

24 An exhaust filter regeneration apparatus as claimed in claim 23 where said electric heater is formed of a catalytic treatment element.

5 25 An exhaust filter regeneration apparatus as claimed in any of claims 17 to 24 in which the fuel injector draws fuel directly from the vehicle fuel tank or fuel line.

10 26 An exhaust filter regeneration apparatus as claimed in any of claims 17 to 25 further comprising an exhaust filter component and a sensor extending radially therein.

15 27 An exhaust filter regeneration apparatus as claimed in any of claims 17 to 26 further comprising a fuel conduit for providing fuel to the fuel injector in which the fuel conduit is preheated by any waste heat.

20 28 An engine or vehicle including an apparatus as claimed in any of claims 17 to 27.

29 A computer programme comprising a set of instructions configured to implement the method as claimed in any of claims 1 to 16.

25 30 A computer arranged to operate under the instructions of the computer programme as claimed in claim 29.

31. An engine control unit configured to implement a method as claimed in any of claims 1 to 16.

5 32. A computer readable medium storing a set of instructions to implement a method as claimed in any of claims 1 to 16.

33. A method or apparatus substantially as described herein with reference to the drawings.